

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A self-priming IV-solution delivery system for intravenous delivery of a solution from a container to a patient when the container is disposed at a height above the patient, comprising:

 a coupling assembly having an input and an output, said input configured for coupling to the container to provide flow of the solution through the coupling assembly to the output;

 a drip chamber having a top wall, a bottom wall, a substantially transparent side wall, an input and an output and coupled, at its input, to said coupling assembly output to receive solution drops formed from the flow of the solution for forming a reservoir defined between said bottom wall and side wall, said drip chamber side wall having an opening located at a height between said top wall and said bottom wall, and a vent plug covering said opening, said vent plug allowing air contained in said drip chamber which becomes displaced upon formation of the reservoir to escape from said drip chamber through said vent plug, said opening being oriented to permit air flow therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber; and

 a patient conduit coupled to said drip chamber output and having a termination end attachable to an intravenous needle of the patient for receiving a flow of solution from the reservoir, said patient conduit having a flow restriction device to restrict the flow of air and

liquid in the patient conduit to allow the reservoir to attain a level at least equal to the height of said vent plug while air in the patient conduit is expelled from said termination end, wherein wetting of said vent plug by the reservoir prevents entry of air through said vent plug to said drip chamber and prevents the exit of solution from said drip chamber through said vent plug.

2. (original) The system of claim 1, wherein said flow restriction device comprises a termination end cap having a vent formed therein, said end cap configured for attachment to said termination end.

3. (previously presented) The system of claim 2, wherein said end cap comprises a termination end vent plug for allowing air present in said patient conduit to pass through said end cap vent and for preventing leakage of solution from said end cap.

4. (original) The system of claim 3, wherein said termination end vent plug comprises a hydrophilic porous material.

5. (original) The system of claim 2, wherein said flow restriction device further comprises a flow restriction device positioned on said patient conduit for selectively closing said patient conduit to isolate the patient from said drip chamber.

6. (original) The system of claim 1, further comprising a flexible conduit coupled between said coupling assembly output and said drip chamber input and having a length for separating a relative distance between said drip chamber and said coupling assembly so that

said drip chamber is positioned in close proximity to the patient to provide observation of said drip chamber, and to provide manipulation of said drip chamber with, at most, minimal disturbance of said coupling assembly.

7. (original) The system of claim 1, wherein a drip orifice is located in said drip chamber top wall for forming the solution drops.

8. (original) The system of claim 1, wherein the height of said side wall opening coincides with a reservoir level occupying approximately 1/3 of the total volume defined in said drip chamber.

9. (original) The system of claim 1, wherein said vent plug comprises an absorbing material and a housing connected to said side wall opening and defining a cavity for receiving a formation of said absorbent material, and wherein said absorbing material comprises a super-absorbent polymer which expands in response to wetting by the reservoir.

10. (original) The system of claim 9, wherein said vent plug further comprises an anti-bacterial agent.

11. (original) The system of claim 1, wherein said vent plug comprises a housing connected to said side wall opening and defining a cavity having a first end in communication with said drip chamber, and a second end in communication with a surrounding atmosphere, said cavity receiving an amount of an absorbing material which expands in response to wetting by the

reservoir, said absorbing material comprising a granular super-absorbent polymer, and further comprising a filter disposed at said first end and a venting membrane disposed at said second end.

12. (original) The system of claim 11, wherein said vent plug further comprises an anti-bacterial agent.

13. (original) The system of claim 1, wherein said vent plug comprises a cannula defining a cavity, and wherein an absorbing material which expands in response to wetting by the reservoir comprises an amount of super-absorbent polymer material disposed in said cavity, said cannula dimensioned for securement within said side wall opening and having a first end in communication with said drip chamber, and a second end in communication with a surrounding atmosphere.

14. (original) The system of claim 1, wherein said vent plug comprises a rigid core of impervious material surrounded by said absorbing material which expands in response to wetting by the reservoir.

15. (original) The system of claim 9, wherein said housing cavity has a trapezoidal cross-section and wherein said formation of said super-absorbent polymer material substantially occupies said housing cavity, said housing further comprising an obstruction positioned at a housing end in communication with said drip chamber for maintaining said formation in said housing cavity.

16. (original) The system of claim 1, wherein said coupling member comprises a piercing member.

17. (original) The system of claim 16, wherein said piercing member defines a closable venting conduit and a liquid conduit.

18. (original) The system of claim 17, wherein said coupling assembly further comprises a funnel portion for directing solution from the container to said drip chamber.

19. (original) The system of claim 18, wherein said coupling assembly further comprises a membrane disposed within said funnel portion for preventing air trapped above said membrane from entering said drip chamber once the container is empty.

20. (original) The system of claim 19, wherein said coupling assembly further comprises an air filter for interfacing an area above said membrane with a surrounding atmosphere to allow air which may be trapped in said coupling member above said membrane to escape to the surrounding atmosphere.

21. (original) The system of claim 1, wherein said coupling member comprises an output end defining a drip orifice for forming the solution drops.

22. (currently amended) A self-priming IV-solution delivery system for intravenous delivery of a solution from a container to a patient when the container is disposed at a height above the patient, comprising:

a coupling assembly having an input and an output, said input configured for coupling to the container to provide flow of the solution through the coupling assembly to the output;

a drip chamber having a top wall, a bottom wall, a substantially transparent side wall, an input and an output and coupled, at its input, to said coupling assembly output to receive solution drops formed from the flow of the solution for forming a reservoir defined between said bottom wall and side wall, said drip chamber side wall having an opening located at a height between said top wall and said bottom wall, and a vent plug covering said opening, said vent plug allowing air contained in said drip chamber which becomes displaced upon formation of the reservoir to escape from said drip chamber through said vent plug, said opening being oriented to permit air flow therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber;

a patient conduit coupled to said drip chamber output and having a termination end attachable to an intravenous needle of the patient for receiving a flow of solution from the reservoir, said patient conduit having a flow restriction device to restrict the flow of air and liquid in the patient conduit to allow the reservoir to attain a level at least equal to the height of said vent plug while air in the patient conduit is expelled from said termination end, wherein wetting of said vent plug by the reservoir prevents entry of air through said vent plug to said drip chamber and prevents the exit of solution from said drip chamber through said vent plug; and

a splash guard connected to said side wall above said vent plug in an interior of said drip chamber and extending across said vent plug.

23. (original) The system of claim 1, further comprising an outer shield connected to said side wall above said vent plug in an exterior of said drip chamber and extending across said vent plug.

24. (currently amended) In an IV-solution delivery system for intravenous delivery of a solution from a container to a patient when the container is disposed at a height above the patient, having a coupling assembly with an input and an output, said input configured for coupling to the container to provide flow of the solution through the coupling assembly to the output, a drip chamber having a top wall, a bottom wall, a substantially transparent side wall, an input and an output and coupled, at its output, to said coupling assembly to receive solution drops formed from the flow of the solution for forming a reservoir defined between said bottom wall and side wall, and a patient conduit coupled to said drip chamber output and having a termination end attachable to an intravenous needle of the patient for receiving a flow of solution from the reservoir, the improvement providing a self-priming of the solution delivery system and comprising:

an opening formed in said drip chamber side wall at a height between said top wall and said bottom wall, and a vent plug covering said opening, said vent plug comprised of a material for allowing air contained in said drip chamber which becomes displaced upon formation of the reservoir to escape from said drip chamber through said vent plug, said opening being oriented to permit air flow therethrough in a direction transverse to the direction of drip

flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber; and

said patient conduit having a flow restriction device to restrict the flow of air and liquid in the patient conduit to allow the reservoir to attain a minimum level at least equal to the height of said vent plug while air in the patient conduit is expelled from said termination end, wherein wetting of said vent plug by the reservoir prevents entry of air through said vent plug to said drip chamber and prevents the exit of solution from said drip chamber through said vent plug.

25. (original) The improvement of claim 24, wherein said vent plug comprises a super-absorbent polymer material which swells in response to wetting by the reservoir.

26. (original) The system of claim 25, wherein said vent plug comprises a housing connected to said side wall opening and defining a cavity for receiving a formation of said super-absorbent polymer material.

27. (original) The system of claim 25, wherein said vent plug comprises a housing connected to said side wall opening and defining a cavity having a first end in communication with said drip chamber, and a second end in communication with a surrounding atmosphere, said cavity receiving an amount of said super-absorbent polymer material in a granular form, and further comprising a filter disposed at said first end and a venting membrane disposed at said second end.

28. (original) The system of claim 25, wherein said vent plug comprises a cannula defining a cavity and containing an amount of said super-absorbent polymer material therein, said cannula dimensioned for securement within said side wall opening and having a first end in communication with said drip chamber, and a second end in communication with a surrounding atmosphere.

29. (original) The system of claim 24, wherein said vent plug comprises a rigid core of impervious material surrounded by a layer of super-absorbent polymer material.

30. (original) The system of claim 26, wherein said housing cavity has a trapezoidal cross-section and wherein said formation of super-absorbent polymer material substantially occupies said housing cavity, said housing further comprising an obstruction positioned at a housing end in communication with said drip chamber for maintaining said formation in said housing cavity.

31. (currently amended) A drip chamber for use in a self-priming solution delivery system for intravenous delivery of a solution from a container to a patient, the solution delivery system including a coupling assembly having an input and an output and configured, at its input, for coupling to the container to provide flow of the solution through the coupling assembly output, and a patient conduit line for providing solution from the container to the patient, said drip chamber comprising:

a top wall, a bottom wall, a substantially transparent side wall, an input and an output and coupled, at its input, to the coupling assembly output to receive solution drops formed

from the flow of the solution for forming a reservoir defined between said bottom wall and side wall, said drip chamber side wall having an opening located at a height between said top wall and said bottom wall, and a vent plug covering said opening, said vent plug allowing air contained in said drip chamber which becomes displaced upon formation of the reservoir to escape from said drip chamber through said vent plug and preventing air from entering said drip chamber through said vent plug and solution from exiting said drip chamber through said vent plug upon wetting of said vent plug by said reservoir, said opening being oriented to permit air flow therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber.

32. (original) The drip chamber of claim 31, wherein said vent plug comprises an absorbing material disposed in said opening.

33. (original) The drip chamber of claim 31, wherein said vent plug is configured as a band of material having a section comprising an absorbing material, said vent plug being disposed about said drip chamber side wall so that said absorbing material is positioned over said opening for covering said opening with said absorbing material.

34. (original) The drip chamber of claim 33, wherein said absorbing material comprises a super-absorbent polymer which expands in response to wetting by said reservoir.

35. (original) The drip chamber of claim 32, wherein the height of said side wall opening coincides with a reservoir level occupying approximately 1/3 of the total volume defined in said drip chamber.

36. (original) The drip chamber of claim 32, wherein said vent plug comprises a housing connected to said side wall opening and defining a cavity for receiving a formation of said absorbing material, and wherein said absorbing material comprises a super-absorbent polymer which expands in response to wetting by the reservoir.

37. (original) The drip chamber of claim 32, wherein said vent plug comprises a housing connected to said side wall opening and defining a cavity having a first end in communication with said drip chamber, and a second end in communication with a surrounding atmosphere, said cavity receiving an amount of an absorbing material which expands in response to wetting by the reservoir, said absorbing material comprising a granular super-absorbent polymer, said vent plug further comprising a filter disposed at said first end and a venting membrane disposed at said second end.

38. (original) The drip chamber of claim 37, wherein said housing cavity has a trapezoidal cross-section and wherein said formation of said super-absorbent polymer material substantially occupies said housing cavity, said housing further comprising an obstruction positioned at a housing end in communication with said drip chamber for maintaining said formation in said housing cavity.

39. (original) The drip chamber of claim 32, further comprising an outer shield connected to said side wall above said vent plug in an exterior of said drip chamber and extending across said vent plug.

40. (currently amended) A drip chamber for use in a self-priming solution delivery system for intravenous delivery of a solution from a container to a patient, the solution delivery system including a coupling assembly having an input and an output and configured, at its input, for coupling to the container to provide flow of the solution through the coupling assembly output, and a patient conduit line for providing solution from the container to the patient, said drip chamber comprising:

a top wall, a bottom wall, a substantially transparent side wall, an input and an output and coupled, at its input, to the coupling assembly output to receive solution drops formed from the flow of the solution for forming a reservoir defined between said bottom wall and side wall, said drip chamber side wall having a first section formed of a first material impervious to the solution and to air for preventing solution exiting said drip chamber through said side wall first section and for preventing air from exiting and entering said drip chamber through said side wall first section, and a second section located at a height between said top wall and said bottom wall and formed of a second material, said second material being pervious to air when said second material is in a dry state to permit air from inside said chamber to escape to an outside environment, said second material being impervious to air and to the solution when said second material is wetted by said reservoir for preventing solution exiting said drip chamber through said side wall second section and for preventing air from exiting and entering said drip chamber through said side wall second section, said second section being oriented to permit air flow

therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber.

41. (original) The drip chamber of claim 40, wherein said second material comprises a super-absorbent polymer which expands in response to wetting by said reservoir.

42. (original) The drip chamber of claim 40, wherein the height of said side wall second section coincides with a reservoir level occupying approximately 1/3 of the total volume defined in said drip chamber.

43. (previously presented) A solution delivery system for intravenous delivery of a solution from a container to a patient, comprising:

a coupling assembly having an input and an output, said input configured for coupling to the container to remove solution from the container;

a patient conduit for providing the removed solution to a patient;

means for regulating a flow rate of solution from said coupling assembly to said patient conduit, said patient conduit coupled at one end to said regulating means and having a termination end at the opposite end thereof; and

a termination end cap coupled to said termination end of said patient conduit and having a vent for restricting the flow of solution into said patient conduit and allowing air displaced by the flow of solution through said patient conduit to escape through said termination end, said termination end cap further comprising a termination end vent plug for preventing the

escape of solution through said vent of said termination end cap upon wetting of said termination end vent plug by the solution.

44. (original) The medical delivery system of claim 43, wherein said termination end cap is releasably detachable to said termination end.

45. (original) The medical delivery system of claim 43, wherein said termination end cap is releasably detachable to said termination end by a luer connection.

46. (original) The solution delivery system of claim 43, wherein said termination end vent plug comprises one of a super-absorbent polymer material and a hydrophobic material.

47. (original) The solution delivery system of claim 43, wherein said regulating means comprises a drip chamber.

48. (original) The solution delivery system of claim 43, wherein said regulating means comprises an infusion pump.

49. (currently amended) A method of intravenous delivery of a solution from a container to a patient, comprising the steps of
disposing the container at a height above the patient;
attaching a coupling assembly to said container for providing flow of the solution from the container;

coupling a drip chamber having a bottom wall, a substantially transparent side wall, an input, an output, an opening in the side wall, and a vent plug disposed over said opening, to said coupling assembly to receive solution drops formed from the flow of the solution, said opening being oriented to permit flow therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber;

connecting a patient conduit to said drip chamber output;

restricting the flow of solution in said patient conduit to a rate below the rate of solution entering said drip chamber to allow a reservoir defined between said bottom wall and side wall to form to a height for wetting said vent plug, said vent plug allowing air contained in said drip chamber which becomes displaced upon formation of the reservoir to escape from said drip chamber through said vent plug;

connecting a termination end of said patient conduit to the patient once the vent plug is wet from the reservoir and air is removed from the patient conduit; and

discontinuing said restriction step upon wetting of said vent plug by said reservoir and removal of air from said patient conduit.

50. (original) The method of claim 49, wherein said restricting step comprises disposing a termination end cap on said termination end, said termination end cap having a vent for allowing air displaced by the flow of solution in said patient conduit to escape through said termination end, said end cap further comprising a termination end vent plug for preventing the escape of solution through said vent upon wetting of said termination end cap plug by the solution.

51. (original) The method of claim 49, wherein said restricting step comprises closing a clamp disposed on said patient conduit.

52. (currently amended) The solution delivery system of claim 47, wherein said drip chamber includes a top wall, a bottom wall, a substantially transparent side wall, an input and an output and is coupled, at its input, to said coupling assembly output to receive solution drops formed from the flow of the solution for forming a reservoir defined between said bottom wall and side wall, said drip chamber side wall having an opening, and a vent plug covering said opening, said vent plug allowing air contained in said drip chamber which becomes displaced upon formation of the reservoir to escape from said drip chamber through said vent plug wherein wetting of said vent plug by the reservoir prevents entry of air through said vent plug to said drip chamber and prevents the exit of solution from said drip chamber through said vent plug, said opening being oriented to permit air flow therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber.

53. (previously presented) The solution delivery system of claim 52, wherein said termination end cap allows the formation of said reservoir in said drip chamber while simultaneously permitting the escape of air from said conduit through said termination end cap.

54. (previously presented) The solution delivery system of claim 3, wherein said termination end cap allows the formation of said reservoir in said drip chamber while simultaneously permitting the escape of air from said conduit through said termination end cap.

55. (currently amended) A self-priming IV-solution delivery system for intravenous delivery of a solution from a container to a patient when the container is disposed at a height above the patient, the system comprising:

a coupling assembly having an input and an output, said input configured for coupling to the container to provide flow of the solution through said coupling assembly to said output;

a drip chamber having a top wall, a bottom wall, a substantially transparent side wall, an opening in said side wall, an input and an output and coupled, at its input, to said output of said coupling assembly to receive drops of the solution formed from the flow of the solution through said output of said coupling assembly, thereby forming a reservoir defined between said bottom wall and said side wall, said opening being oriented to permit air flow therethrough in a direction transverse to the direction of drip flow of solution from said input to said output of said drip chamber, thereby permitting the substantially unobstructed view of the drip of solution in said drip chamber;

a drip chamber vent plug covering said opening in said drip chamber, said drip chamber vent plug allowing air contained in said drip chamber which becomes displaced upon formation of said reservoir to escape from said drip chamber through said drip chamber vent plug, said drip chamber vent plug being formed at least partly by a wettable material which seals upon wetting, so that wetting of said drip chamber vent plug prevents entry of air through said

drip chamber vent plug into said drip chamber and prevents the exit of solution from said drip chamber through said drip chamber vent plug;

a patient conduit coupled to said drip chamber output and having a termination end attachable to an intravenous needle that may be attached to the patient for receiving a flow of solution from said reservoir and dispensing that flow to the patient;

a termination end cap at said termination end of said patient conduit, said termination end cap including a termination end vent for allowing air entrapped in said patient conduit prior to use to be purged from said patient conduit before the solution is introduced to the patient, said termination end cap having a termination end vent plug for allowing air present in said patient conduit to pass through said termination end vent and for preventing leakage of solution from said termination end cap, said termination end vent plug being formed at least partly by a wettable material which seals upon wetting, so that wetting of said termination end vent plug by the solution flowing through said conduit prevents the exit of solution from said patient conduit through said termination end cap; and

wherein said drip chamber vent plug and said termination end cap cooperate to allow the formation of said reservoir to proceed while purging of said entrapped air from said patient conduit until at least one of said drip chamber vent plug and said termination end vent plug is wetted and thereby sealed.